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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/536,641	05/27/2005	Pierluigi D'Alessandro	DE020297	4712

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EXAMINER

SHAH, TANMAY K

ART UNIT	PAPER NUMBER
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2611

NOTIFICATION DATE	DELIVERY MODE
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04/18/2008

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/536,641	Applicant(s) D'ALESSANDRO, PIERLUIGI	
	Examiner TANMAY k. SHAH	Art Unit 2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 May 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>5/27/2005</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This communication is in response to Application No. 10/536,641 filed on 05/27/2005, claims 1 – 13 have been examined.

Claim Objections

2. Claim objected to because of the following informalities: Synchronization is spelled as "Synchronisation". Appropriate correction is required.

Specification

3. Specification objected to because of the following informalities: Synchronization is spelled as "Synchronisation". Appropriate correction is required.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claim 1 rejected under 35 U.S.C. 102(b) as being anticipated by Ciccareli et al. (US 2003/0139167) (Ciccareli hereafter).

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Regarding claim 1, Ciccareli teaches Receiver (i.e. receiver, Fig. 3, page 3, paragraph 32) for estimation or compensation of phase imbalance or gain imbalance (i.e. compensation of I-Q imbalance, phase/gain error, page 5, paragraph 54, page 6, paragraph 67), the receiver utilizing a QPSK modulation and a modulation scheme based on a complex scrambling code (page 2, paragraph 18, i.e. sequentially generates CW signals, page 6, paragraph 72), the receiver comprising means for estimating the phase imbalance or gain imbalance before synchronization (i.e. compensation of I-Q imbalance, phase/gain error, page 5, paragraph 54, page 6, paragraph 67).

Regarding claim 2, Receiver according to claim 1, wherein the means for estimating the phase imbalance or gain imbalance before synchronization comprises means for generating **at least one first ratio** selected from the group consisting of a second ratio, a third ratio and a fourth ratio; wherein second first ratio is a ratio between a cross correlation of I and Q components ($\langle Q \rangle$) of an incoming I/Q modulated signal and a mean value of a square of the I component ($\langle I, Q \rangle$); wherein the third ratio is a ratio between the cross correlation of the I and Q components and a square root of a product between a mean value of the square of the I component and a mean value of a square of the Q component ($((\langle I^2 \rangle \langle Q^2 \rangle)^{1/2})$); and wherein the fourth ratio between the mean value of the square of the Q component ($\langle Q^2 \rangle$) and the mean value of the square of the I

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($\langle I^2 \rangle$) component (i.e. the ratio of the RMS voltage of I and Q signals, page 6, paragraph 71).

Regarding claim 3, Receiver according to claim 1, wherein the means for estimating the phase imbalance or gain imbalance (i.e. compensation of I-Q imbalance, phase/gain error, page 5, paragraph 54, page 6, paragraph 67) before synchronization comprises a low pass for low pass filtering the signals (i.e. LPF, 128 of Fig. 3, page 3, paragraph 41).

Regarding claim 4, there are substantially same limitations as claim 2, thus the same rejection is applicable.

Regarding claim 6, Receiver according to claim 1, wherein the estimation of the phase imbalance or gain imbalance is carried out iteratively (page 6, paragraph 71).

Regarding claim 7, there are substantially same limitation as claim 1, thus the same rejection is applicable.

Regarding claim 8, there are substantially same limitations as claim 2, thus the same rejection is applicable.

Regarding claim 10, there are substantially same limitations as claim 6, thus the same rejection is applicable.

Regarding claim 11, there are substantially same limitations as claim 1, this the same rejection is applicable (page 6, paragraph 69, page 8, claim 28)

Regarding claim 12, Method of iteratively compensating a phase imbalance or gain imbalance in a receiver, the receiver utilizing a QPSK modulation and a modulation scheme based on a complex scrambling code, comprising the steps of:

- a) determining an error function on the basis of samples of phase compensated in-phase components and quadrature components of a revived I/Q modulated signal (i.e. I and Q, page 2, paragraph 18);
- b) filtering the error function (LPF or digital filter of Fig. 3);
- c) integrating the filtered error function (i.e. mixer, page 5, paragraph 54);

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- d) determining a modified error function by adding the integrated and filtered error function to a product of the integrated and filtered error function and a parameter based on speed (i.e. kHz frequency) and stability (page 6, paragraph 67);
- e) determining a corrected output signal of the I/Q components of the received signal on the basis of subsequent samples of phase compensated in-phase components and quadrature components of the received I/Q modulated signal and the modified error function (page 5, paragraph 71, page 6, paragraph 67); and
- f) returning to step a).

Regarding claim 13, Method of iteratively compensating a phase imbalance or gain imbalance in a receiver, the receiver utilizing a QPSK modulation and a modulation scheme based on a complex scrambling code, comprising the steps of:

- a) determining an error function on the basis of squared samples of phase compensated in-phase components and quadrature components of a received I/Q modulated signal (i.e. I and Q, page 2, paragraph 18);
- b) filtering the error function (LPF or digital filter of Fig. 3);
- c) integrating the filtered error function (i.e. mixer, page 5, paragraph 54);
- d) determining a modified error function by adding the integrated and filtered error function to a product of the integrated and filtered error function and

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a parameter based on speed and stability (page 6, paragraph 67);

e) determining a gain on the basis of a product of the modified error function and a factor (page 6, paragraph 67);

f) determining a corrected output signal of the I/Q components of the received signal on the basis of subsequent samples of phase compensated in-phase components and quadrature components of the received I/Q modulated signal and the gain (page 5, paragraph 71, page 6, paragraph 67); and

g) returning to step a).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 5-6, 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cicccarelli in further view of Zheng et al. (US 2004/0002323).

Regarding claim 5, Cicccarelli teaches receiver of claim 1, although it says is CDMA technology, however it does not explicitly says the receiver is a WCDMA (UMTS) receiver and feed-forward scheme or a feed-back scheme is established in the receiver.

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Zheng et al. teaches that the system could be used in WCDMA (UMTS) receiver and feed-forward scheme or a feed-back scheme is established.

It would have been obvious at the time the invention was made to combine the teachings of Ciccarelli with Zheng. Because in doing so it will provide better estimate of phase and/or gain imbalance. One would be motivated to combine those teachings because it will provide better estimate of phase and/or gain imbalance by doing the process again by feeding it back to the input.

Regarding claim 9. Ciccarelli teaches receiver of claim 1, although it says is CDMA technology, however it does not teach that it uses a feed-forward scheme or a feed-back scheme is established in the receiver.

Zheng et al. teaches uses feed-forward scheme or a feed-back scheme is established.

It would have been obvious at the time the invention was made to combine the teachings of Ciccarelli with Zheng. Because in doing so it will provide better estimate of phase and/or gain imbalance. One would be motivated to combine those teachings because it will provide better estimate of phase and/or gain imbalance by doing the process again by feeding it back to the input.

Pertinent prior art

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Coersmeiner (US 2004/0193965) teaches error adjustment in direct conversion architectures.

Peterzell et al. (US 2003/0040292) teaches local oscillator leakage control in direct conversion processes.

Nielsen (US 2003/0045249) teaches feedback compensation detector for a direct conversion transmitter.

Warner et al. (US 6940916) teaches wideband analog quadrature modulator/demodulator with pre-compensation/post-compensation correction.

Sahlman (US 6934341) teaches method and apparatus for plurality signal generation.

Sousa et al. (US 2002/0131480) teaches spread spectrum receiver.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to TANMAY k. SHAH whose telephone number

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is (571)270-3624. The examiner can normally be reached on Mon-Thu (7:30 - 5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Payne can be reached on 571-272-3024. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

T.S.
Patent Examiner

/David C. Payne/

Supervisory Patent Examiner, Art Unit 2611